UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

SEP 4 1992

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OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

MEMORANDUM:

SUBJECT: PP#1F03991 and PP#1F03935 - Triclopyr DowElanco Rice Herbicide on Rice Grain and Straw and Triclopyr Aquatic Herbicide on Various Aquatic Sites - Permanent Tolerances on Fish, Shellfish, Poultry Commodities, Rice Grain, Rice Straw and Irrigated Crops and Crop Groups; and a Proposed Action Level In Potable Water - Review of April 4, 1991, October 15, 1991 and June 27, 1991 DowElanco Submissions. MIRD Nos. 41200304, 41865900, 41865901, 41714304-07 (CBTS Nos. 8078, 8079, 8223, 8224, 8561, 8562, 8786, 8793, and 8962-8984).

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and

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Background

In the subject petitions (PP#1F03991 for rice grain and straw and PP#1F03935 for fish, shellfish and potable water) Dow Elanco is proposing permanent tolerances for the combined residues of the herbicide triclopyr (3,5,6-trichloro-2-pyridinyloxyacetic acid) and its metabolite (2-methoxy-3,5,6-trichloropyridine) as follows:

0.3 ppm in/on rice grain
8.0 ppm in/on rice straw
0.2 ppm in fish
1.0 ppm in shellfish

and a proposed action level at:

0.5 ppm in potable water

and the following proposed permanent tolerances in irrigated crops and crop groupings resulting from use of treated water for irrigation as well as tolerances in rotational crops and crop groupings for triclopyr and its metabolite as follows:

0.05 ppm in/on avocadoes
0.05 ppm in/on brassica vegetables
0.05 ppm in/on bulb vegetables
0.05 ppm in/on citrus fruits
0.05 ppm in/on cotton seed
0.05 ppm in/on cucurbit vegetables
0.05 ppm in/on fruiting vegetables
0.05 ppm in/on grain crops excluding rice grain
0.05 ppm in/on grain crops forage, fodder excluding rice straw
0.05 ppm in/on hops
0.05 ppm in/on leafy vegetables
0.05 ppm in/on leaves of root and tuber vegetables
0.05 ppm in/on non-grass animal feeds
0.05 ppm in/on nuts
0.05 ppm in/on pome fruit
0.05 ppm in/on root crops, vegetables
0.05 ppm in/on legume vegetables
0.05 ppm in/on legume vegetables forage
0.05 ppm in/on small fruit
0.05 ppm in/on stone fruit

and the following proposed permanent animal tolerances for the parent only as follows:

0.1 ppm in poultry meat, fat and meat byproducts except kidney
0.05 ppm in eggs

Current permanent tolerances for triclopyr and its metabolites (3,5,6-trichloro-2-pyridinol) and (2-methoxy-3,5,6-trichloropyridine) in plant commodities and triclopyr and its metabolite (3,5,6-trichloro-2-pyridinol) in animal/ruminant commodities are published under 40 CFR 180.417 and include grass forage and hay at 500 ppm, and animal/ruminant tolerances for milk at 0.01 ppm; and meat, fat, and meat byproducts (except liver and kidney) of cattle, goats, hogs, horses, and sheep at

0.05 ppm; and liver and kidney of cattle, goats, hogs, horses and sheep at 0.5 ppm.

Temporary tolerances for triclopyr and its metabolites on rice grain and rice straw at 0.5 and 8.0 ppm, respectively, and for the parent only in poultry, including poultry meat, fat and meat byproducts except kidney at 0.2 ppm, and poultry kidney at 1.0 ppm and in eggs at 0.03 ppm were approved under PP#8G3571 per a June 24, 1988 CBRS review of M. Metzger.

Temporary tolerances for triclopyr and its metabolites in fresh water fish and shellfish at 0.2 ppm, and an Allowable Residue Level In Drinking Water (ARLDW) in potable water at 0.5 ppm, were first approved under PP#6G3306 per an expedited May 13, 1987 CBRS review of L. Cheng and extended per an April 9, 1991 CBRS review of D. McNeilly. Permanent tolerances for triclopyr and its metabolite (2-methoxy-3,5,6-trichloropyridine) in fish and shellfish at 0.2 ppm and 1.0 ppm, respectively and a proposed action level in potable water at 0.5 ppm were proposed under PP#1F03935, and were rejected by CBTS because of numerous deficiencies (see 11/27/91 memo of G. Otakie).

Triclopyr is a List B chemical and Phase 4 reviews for triclopyr, salts and esters (i.e. triethylammonium triclopyr and butoxyethyl triclopyr) were completed by CBRS (see April 25,1991 reviews of J. Smith), with corresponding DCI's subsequently issued by SRRD. Also a Triclopyr List B Inventory-Residue Chemistry dated January 10, 1990 and a Triclopyr and Salts List B-Residue Analytical Methods Inventory dated June 29, 1990 both prepared by Dynamac were approved by HED on May 21, 1990 and July 3, 1990, respectively.

In brief, the Phase 4 triclopyr reviews cited numerous **deficiencies** including the following major areas:

- Product chemistry

- Nature of the residue in plants

- Nature of the residue in animals (i.e. ruminants); **poultry metabolism was not reviewed since no registered uses on poultry feed items currently exist.**

- New analytical methodology for both plant and animal commodities may be needed if new metabolites are found in the required plant and animal metabolism studies.

- A new feeding study in ruminants may be needed depending on the results of the required ruminant metabolism and grass field trial studies.

- Storage stability studies on all crops and processed commodities are also required (i.e. grass is the only RAC currently with a permanent tolerance).

- New field trials for grass are needed.

In accordance with the following 4/4/91 petitioner request, EPA is reviewing the two petitions on aquatic and crop use together:

"On November 15, 1990, a petition was submitted to the Agency for tolerances of triclopyr and its metabolite in and on fish and shellfish. The Agency assigned PP#1F3935. It is important that the reviewer review these two petitions together. Both PP# 1F3935 and this petition utilize the same chemical/formulation , triclopyr triethylamine salt (3 lb a.e./gal.) . Many of the studies from PP#1F3935 apply to this petition as residues in water, sediment or aquatic plants and studies summarized in this petition apply to PP#1F3935, i.e. irrigation crop studies. DowElanco expects these two petitions to move together at the Agency."

At a 7/23/92 meeting with DowElanco possible revisions to the proposed use and related technical questions were discussed. These proposals when formally submitted to EPA will likely change many of the conclusions in this review.

Present Submission

The present submission includes a tolerance petition including Sections A-G and with a proposed label, residue data in rice and processed products, irrigated crops, water, fish and shellfish, and the analytical methods for triclopyr and its metabolite in water and irrigated crops.

Conclusions

1. The current proposed use in these petitions is extensive and includes nearly every conceivable aquatic use site in the U.S. (i.e. ponds, lakes, reservoirs, streams, rivers, drainage canals and ditches, swamps, marshes, wetlands, and similar sites, and the banks and shorelines of these sites including dams and levees) using a variety of application methods including helicopter, boat and land based equipment; as well as rice.

2. Inadequate product chemistry data are available to support the proposed aquatic use of triclopyr. Product chemistry data deficiencies are discussed in CBRS reviews related to the reregistration of this List B chemical and include a description

of the beginning materials, manufacturing process, preliminary analysis, discussion of formation of impurities, physical/chemical characteristics, etc..

3. The proposed Section B's for aquatic use and rice are unacceptable. Numerous label revisions are required.

3.a. The statement "Do not trap or dig for shellfish within treated area for 7 days" is not a viable label restriction and should be deleted from the proposed label.

3.b. Irrigation restrictions based on holding water for a specified time interval over 24 hours after treatment are not practical (except ponds under the control of the user). Accordingly, all such restrictions should be deleted from the label. Irrigated crop residue data should reflect application of water to crops at the proposed 0.50 ppm action level for triclopyr in potable water. If phytotoxicity problems occur using irrigation water at this residue level, modification of the proposed use may be required.

3.c. Statements restricting the irrigation of specific crops (e.g. certain broadleaf crops such as grapes, beans, tomatoes, and cotton) and the type of irrigation (e.g. overhead irrigation) are not viable label restrictions and also should be deleted. The restriction is not practical because growers would not necessarily know that the irrigation water contains triclopyr and may use the water to treat any crop regardless of the label restriction.

3.d. The statements restricting water use for 7 days if application is made closer than 1/4 or 1/2 mile of a potable water intake is not a viable label restriction because it would not be possible to avoid intake of the water for seven days. A prohibition restricting use within 1/4 or 1/2 mile from potable water intakes would be acceptable if supported by adequate water residue field trial data and appropriate action level in water.

3.e. A maximum annual label application rate (i.e. in terms of gallons of end use product) and a minimum application interval for use at each of the proposed sites, with supporting water residue field trial data, are needed for all the proposed uses.

3.f.. Special label precautions for ditchbank/shoreline treatment are required to minimize overspray/overlap (e.g. limit to 3 feet or less). These precautions may not be practical for helicopter and boat ditchbank/shoreline application and consequently other label revisions may be necessary. Also see Conclusion No. 10.d. regarding this issue.

3.g. The different types of application proposed for treatment of emersed or floating weeds (i.e. helicopter, high volume sprays, backpack, and boat application), and treatment of submersed weeds (ground, aerial or boat surface or subsurface application) must each be supported by appropriate water residue field trial data representing all the various sites.

3.h. More detailed information including spray pressures, nozzles, spray volumes, calibration procedures, etc. for the various types of application equipment/procedures should be provided.

3.i. The use directions for control of submersed aquatic weeds provide for either surface or subsurface application using either ground, boat or aerial application equipment. Further information and recommended procedures for the six (6?) treatment options are needed.

3.j. The table recommending gallons of RENOVATE/acre of water, required to maintain one of four (i.e. 1.0, 1.5, 2.0, or 2.5 ppm) ambient concentrations of triclopyr in water at depths of 1, 2, 4 or 6 feet should be clarified (e.g. footnotes and examples would be helpful) and expanded to include depths up to a minimum of 10 feet. A sample calculation should also be added to allow calculation of the appropriate dose of end use product for any depth or herbicide concentration.

3.k. For ditch bank/shoreline application, label restrictions on proposed treatment intervals (e.g. 24 hours) and the maximum length of shoreline which may be treated at one time are needed.

3.l. The proposed Section B for use on rice requires revision to clarify the latest recommended time of application, i.e., reiterate the PHI and ensure that the proposed directions for application based on weed growth stage will not result in product misuse.

4. The nature of the residue in water is not adequately understood. A 28 day radiolabeled water metabolism/degradation study under field conditions showing the fate of the herbicide in water is required. Alternatively, the petitioner may submit a proposed metabolic pathway under similar field conditions from available environmental fate studies.

5.a. The nature of the residue in fish/shellfish is not adequately understood. A new seven day Bluegill fish metabolism study identifying 90% of the residue in edible fish tissue is required.

5.b. A revised Section F may be required. CBTS notes that the petitioner has excluded the 3,5,6-trichloro-2-pyridinol (TCP) metabolite in the proposed permanent tolerance expression for fish. The existing fish metabolism study identified up to 26% of the total ^{14}C residue in fish remainder as the 3,5,6-trichloro-2-pyridinol metabolite. A decision on the need to include TCP in the tolerance expression is deferred pending resolution of whether TCP is of toxicological significance for triclopyr (NOTE: a TOX deferral is pending). It appears that an FAT for processed fish products may also be needed (see Conclusion No. 13.b.).

6.a. The nature of the residue in plants is not adequately understood. The recent Phase 4 review for List B chemicals required submission of a new grass metabolism study (grass is the only currently registered RAC). The results of the grass metabolism study will be translatable to rice.

6.b. The nature of the residue in irrigated crops is not adequately understood. Acceptable plant metabolism data on at least three crops are required. In accordance with the guidelines, if the results of the three metabolism studies on dissimilar crops indicate a similar metabolic route in the three crops, then additional metabolism studies will not be required. Tentatively, the required grass metabolism study will satisfy one of the required studies. Additional metabolism studies representing a root vegetable and a fruit are required.

7.a. The nature of the residue in ruminants is not adequately understood. The recent Phase 4 review for List B chemicals required submission of a new ruminant metabolism study. Review of the original feeding studies, under this petition, has revealed a likelihood for concentration of triclopyr residues in milk fat. Accordingly, the new ruminant metabolism study must provide adequate characterization of triclopyr residues in milk and milk fat, as well as edible tissues.

7.b. For purposes of these petitions and their proposed tolerances the nature of the residue in poultry is adequately understood and consists of the parent triclopyr.

8.a. A decision concerning the adequacy of current analytical methodology for triclopyr and its metabolites in plants is deferred pending a review of the required plant metabolism studies.

8.b. A decision concerning the adequacy of current analytical methodology for triclopyr and its metabolites in water is deferred pending a review of the required water metabolism study.

8.c. A decision concerning the adequacy of the current analytical methodology for triclopyr and its metabolites in fish/shellfish is deferred pending a review of the required fish metabolism study.

8.d. A decision concerning the adequacy of the current analytical methodology for triclopyr and its metabolites in ruminants is deferred pending review of the required ruminant metabolism study.

8.e. A separate copy of the proposed analytical methodology for triclopyr in poultry meat, fat, meat byproducts except kidney and eggs is required.

9. Adequate storage stability data on triclopyr and its metabolites in water, fish, plants, processed products and animals to support residue data are required.

10.a. Extensive studies on both stagnant and moving bodies of water providing geographically representative field trial data on the residues of triclopyr and its metabolites in potable water, and reflecting the various application procedures and label restrictions proposed on all use sites, are needed to support the proposed potable water action level and fish/shellfish permanent tolerances. The petitioner should attempt to design the field trials to represent likely field conditions including moderate to heavy weed growth at the various use sites proposed. Since the half-life of triclopyr is highly dependent on light conditions (i.e. half-life of 0.5 days, 1.2 days, and 4.7 months under sterile buffered conditions, natural river water and dark aerobic conditions, respectively) the degree of weed growth, depth, light intensity, temperature, mixing etc. are variables which should be reflected in the field trial data. CBTS notes that per PP#7G3306 (see April 9, 1991 memo of D. McNeilly) CBRS recommended approval of a proposed EUP for triclopyr which included aquatic use on 2,040 acres in 22 States.

10.b. The water field trial data must adequately reflect the proposed Section B. If, as currently on the proposed label, application to ponds, lakes, reservoirs, streams, rivers, drainage canals and ditches, swamps, marshes, wetlands, and similar sites, and the banks and shorelines of these sites including dams and levees is proposed, using helicopter, boat (i.e., both surface and subsurface), and land equipment (i.e. both truck and backpack), then geographical representative field trial data representing all these sites and different application procedures are required.

10.c. The water residue field trial data must adequately support proposed label restrictions (or the revisions CB has suggested).

If dilution of the maximum proposed use rate of 2.5 ppm triclopyr to the proposed potable water action level of 0.5 ppm is assumed, and application closer than 1/4 or 1/2 mile of potable water intakes is prohibited, then the field trial data should support this hypothesis at the various sites, and in both stagnant and moving water. Residue data at various distances from the application sites and time periods after application will be required to support proposed labeling requirements for time and distance restrictions for potable water intakes.

10.d. CBTS tentatively concludes that the residue results of the new ditch bank study are lower and inconsistent with the original ditch bank study because specific instructions were given in the study protocol to minimize overspray of ditches or canals. New geographically representative ditch bank/shoreline field trials representing all the proposed treatment methods (i.e. land, boat and air) on both moving and stagnant shoreline areas (at various flow rate and depths), and reflecting commercial application techniques are required. Although CBTS tentatively concludes that label precautions totally restricting overspray are not practical (especially for helicopter and boat application), the practicality of label precautions minimizing overspray will be considered depending on the type of application and restriction proposed. Residue data and label restrictions on proposed treatment intervals (e.g. 24 hours) and the maximum length of shoreline (i.e. application of both sides of the stream/canal) which may be treated at one time are also needed.

11. Additional geographically representative data on the magnitude of the residue in fish/shellfish are required to support the proposed permanent tolerances on fish/shellfish. As per the Guidelines although field studies under natural conditions using cages are preferred, controlled exposure aquaria studies are also acceptable. Fish residue data for both predators (e.g., bass) and bottom feeders (e.g., catfish) are required. CBTS notes that the proposed aquatic use encompasses wetland areas and that the available data indicate that higher residues are likely in shellfish than fish. Accordingly, based on the current proposed use it is imperative that adequate residue data on both molluscs (e.g., clams, oysters) and crustaceans (e.g., shrimp, crabs) are provided.

12.a. Data on triclopyr residues in irrigated crops has been submitted under PP#1F03991 for the proposed use of triclopyr on rice. Irrigated crop residue data for all the crop groupings (see 40 CFR §180.34) plus crops that don't fall into the crop groupings are required. As discussed under the Nature of the Residue - Irrigated Crops, three plant metabolism studies on dissimilar crops are also required to determine the nature of the residue in plants. A final decision on the adequacy of any irrigated crop field trial data is deferred pending the review of the required plant metabolism studies and a determination of the nature of the residue in plants. A revised Section F proposing tolerances for irrigated crops may be required.

12.b. In light of the proposed 0.50 ppm action level for triclopyr in potable water, irrigated crop residue data reflecting irrigation water containing 0.10 ppm (100 ppb) triclopyr are not acceptable. The minimum acceptable concentration of triclopyr in water for an irrigation crop residue study must equal the proposed potable water action level which is currently 0.50 ppm triclopyr, since it is always possible that potable water could be used for irrigation. Accordingly, a new irrigation crop residue study using water at a minimum triclopyr concentration of 0.50 ppm is required.

12.c. A decision on the need for separate tolerances on rotational crops is deferred pending EFED's review and conclusions of rotational crop data submitted under 165-1: Confined Rotational Crops. In the interim and in the absence of an established need for rotational crop tolerances or rotational crop field trial data the proposed Section F for crop tolerances resulting from the use of treated water for irrigation of crops should be revised to exclude reference to tolerances for rotational crops.

13.a. A fish/shellfish processing study is required which provides residue data in whole fish protein concentrate and processed fish products (e.g. smoked, canned, etc.). The processing study should simulate commercial practices as closely as possible. Fish samples used in the processing study must contain detectable residues, preferably at or near the proposed tolerance levels, so that concentration factors for the various processed products can be determined. If necessary fish should be exposed to an exaggerated ambient residue level, in order to obtain sufficient residue level for the processing studies. Adequate storage stability data for the processed fish products should also be provided to validate analytical results.

13.b. A final decision on the need for and the appropriate FAT's for processed fish products is deferred pending review of acceptable fish metabolism and fish processing studies.

13.c. Permanent tolerances on irrigated crops/crop groups will be required. Accordingly, representative processing studies simulating commercial food processing will also be required where detectable residues are found on the RAC's.

13.d. The rice processing study indicates that neither triclopyr nor its TCP and 2-methoxy-3,5,6-trichloropyridine metabolites concentrate in rice processed fractions. However, a final decision on the adequacy of the rice processing study and possible need for FAT's for processed rice commodities is deferred until the nature of the residue in rice is known, and a description of the processing procedures used in the processing study and additional information on the conditions of sample storage during the study (e.g. to and from the processor) are provided.

14. A final decision on the adequacy of the rice field trial data cannot be made until an acceptable grass metabolism study, storage stability data and clarification of the PHI's for the single application field trial data are provided. A revised Section F raising the proposed tolerance in rice straw to 10.0 ppm is also tenatively required, pending resolution of the above issues.

15.a. A revised Section F proposing tolerances on poultry eggs, meat, fat and meat byproducts except kidney of 0.05 ppm is required for the proposed uses.

15.b. CBTS is deleting the previous requirement (see PP#1F03935; 11/27/91 review of G. Otakie Conclusion No. 14.a.) for a new ruminant feeding study and a revised Section F proposing tolerances on meat, fat, meat by-products, milk, and milk fat based on the fact the majority of ruminant dietary burden results from the approved triclopyr tolerances on grass forage and hay (i.e. 500 ppm) rather than the proposed uses under these petitions. The need for a new ruminant feeding study and revised tolerances will be evaluated as part of the List B Reregistration Process.

16. Multiresidue testing data for triclopyr and any regulated metabolites are required.

Recommendation

At this time, CBTS recommends against establishing the proposed tolerances for triclopyr and its metabolite (2-methoxy-3,5,6-trichloropyridine) in/on fish, shellfish, rice grain, rice straw, irrigated crops, poultry commodities and the proposed action level for triclopyr and its metabolite in potable water for the reasons cited under Conclusion Nos. 2 thru 15.a. and 16

Detailed Considerations

Product Chemistry

The formulation proposed for use in this petition is DowElanco Rice Herbicide containing 44.4 % triclopyr as the trimethylamine salt, equivalent to 31.8% or 3 lb/gal triclopyr acid equivalent. The directions provide for mixing in a minimum of 5 gallons of water and the addition of a non-ionic surfactant such as Valent X-77, Triton AG-98 or similar wetting agent is recommended.

Questions pertaining to the possible formation of pyridine dioxin in the manufacture of triclopyr, were first raised by CBTS under PP#1F2508 (see May 25,1985 memo of B. Quick), and the required product chemistry data will resolve this issue. Per a May 21, 1992 review by S. Funk (see List B File) CBRS concluded that nitrosoamine formation is not probable in the manufacture of triclopyr and TCDP is not of toxicological concern regardless of the potential for formation. CBRS's June 1991 Response to Phase 3 Submission for triethylammonium triclopyr (i.e. Case Number 2710, Chemical Number 116002) noted deficiencies for the following product chemistry requirements which were also discussed in a CBRS February 12, 1992 review by S. Funk (see List B File:

* 61-2 - Beginning materials and manufacturing process
* 61-3 - Discussion of impurities
* 62-1 - Preliminary analysis
* 62-3 - Analytical method
* 63-3 - Physical state
* 63-4 - Odor
* 63-5 - Melting point
* 63-6 - Boiling point
* 63-7 - Density
* 63-8 - Solubility
* 63-9 - Vapor Pressure
* 63-10 -Dissociation constant
* 63-11 -Octanol/water partition coefficient
* 63-12 -pH

All of the above product chemistry deficiencies must be resolved.

Proposed Use

A. **Renovate Aquatic Herbicide** contains 3 lbs/gallon acid equivalent triclopyr (i.e. 31.8%) and is for the control of woody plants and annual and perennial herbaceous weeds in:

-aquatic sites including: ponds, lakes, reservoirs, streams, rivers, drainage canals and ditches, irrigation canals and ditches, bogs, swamps, marshes, wetlands and similar sites, and the banks and shorelines of these sites including dams and levees.

The terrestrial uses not associated with aquatic sites will not be considered under this review.

Renovate Aquatic Herbicide is a selective, systemic herbicide which is taken up through foliar or cut surfaces. Renovate is recommended for the control of unwanted woody plants and annual and perennial herbaceous weeds in aquatic sites, the banks and shorelines of aquatic sites and the above terrestrial sites. Treated aquatic weeds may include shoreline, ditchbank, emersed, floating, or submersed species, and a list of 54 weeds controlled with Renovate are included on the label. The proposed use includes restrictions against applying within 1/2 mile of a potable water intake or alternatively to restrict water use for 7 days after application and provides recommended time frames for restricting irrigation water use from treated areas.

To control susceptible submersed aquatic weeds in ponds, lakes, reservoirs, and slow moving or nonmoving areas of canals, ditches, streams and rivers, apply RENOVATE Aquatic Herbicide as either a surface or subsurface application, using either ground, boat or aerial application equipment. Rates should be selected to provide 1 to 2.5 ppm a.e. of herbicide in the treated water with application rates varying with depth and the maximum application rate in water 6 feet or deeper of 13.6 gallons/acre (i.e. 40.8 lbs ae/A).

For more specific details of the proposed use on aquatic sites see PP#1F03935 (11/27/91 review of G. Otakie)

A. DowElanco Rice Herbicide contains 3 lbs/gallon acid equivalent triclopyr (i.e. 31.8%) and is a postemergence systemic herbicide for the control of certain broadleaf weeds in rice with control through foliar uptake; therefore, thorough coverage of target weeds is important.

The following is the proposed Section B on rice:

GENERAL INFORMATION

"DowElanco Rice Herbicide is a postemergence systemic herbicide for the control of certain broadleaf weeds in rice. DowElanco Rice Herbicide controls broadleaf weeds through foliar uptake; therefore, thorough coverage of target weeds is important. DO NOT apply under conditions which would allow spray drift to come in contact with adjacent broadleaf crops as crop injury may occur.

"Special Use Precautions

1. Apply this product to rice only as specified on this label. Do not apply to any other crop or site.
2. Do not apply this product through any type of irrigation system.
3. To minimize rice injury, do not apply this product after the 1/2" internode elongation stage of rice development. Do not apply in the booting or subsequent stages of rice development.
4. Direct application to ditches used to transport irrigation water is prohibited.
5. Do not apply where runoff or irrigation water may flow onto agricultural land other than rice fields as injury to crops may occur.
6. Do not apply DowElanco Rice Herbicide directly to, or otherwise permit it to come into contact with, cotton, soybeans, grapes, tobacco, vegetable crops, flowers, ornamental shrubs or trees, or other desirable broadleaf plants, as serious injury may occur. DO NOT permit spray mists containing DowElanco Rice Herbicide to drift onto desirable broadleaf plants.
7. Do not plant crops other than rice for 6 months following treatment.
8. When using tank mixtures, read and follow the use directions and precautions on each product label.
9. Do not use for manufacturing or formulating.
10. Preharvest Interval: Do not apply later tan 45 days before harvesting rice."

MIXING INSTRUCTIONS

"When preparing spray mixtures, the recommended order of addition to the spray tank is half the water, flowable granule or wettable powder herbicide (if used), drift control agent (if used), additional herbicide (if used), and DowElanco Rice Herbicide. Then add the remainder of the water. The non-ionic surfactant should be added last unless otherwise specified on the surfactant label. If a flowable granule or wettable powder herbicide is used, this material should be premixed in water and the premix added to the spray tank with agitation. Moderate continuous agitation is also required when DowElanco Rice Herbicide is tank mixed with emulsifiable concentrate herbicides. When using any tank mixture, read and follow the use directions and precautions on each product label.

"Spray Surfactants:
For best broadleaf weed control when DowElanco Rice Herbicide is used alone or in tank mix combination with Basagran or Blazer use of a non-ionic agricultural surfactant such as Valent X-77, Triton AG-98 or similar

wetting agent, is recommended. The suggested rate of surfactant addition to the spray mixture is 0.25% to 0.5% by volume (2 to 4 pints per 100 gallons of spray mixture) unless otherwise recommended by the surfactant label. Read and follow all use directions and precautions on the surfactant label.

APPLICATION DIRECTIONS

"Application Methods

Aerial Application: Broadcast apply DowElanco Rice Herbicide in a minimum of 5 gallons of spray mixture per acre. Apply at a height which provides the most effective swath width for the aircraft. Fixed-wing aircraft or helicopters should have a well-designed spray system that produces a uniform spray pattern and minimizes spray drift.

Ground Application: Broadcast apply DowElanco Rice Herbicide in a minimum of 10 gallons of spray mixture per acre. Flat fan nozzles are recommended. Utilize a well-designed spray system that produces a uniform spray pattern and minimizes spray drift.

"Avoid Spray Drift

Make applications only when there is little or no hazard from spray drift. Small quantities of spray, which may not be visible, may seriously injure susceptible plants. DO NOT spray when wind is blowing toward susceptible crops or ornamental plants that are near enough to be injured. It is suggested that a continuous smoke column or similar equipment be used at the spray site to detect air movement, lapse conditions, or temperature inversions. If the smoke layers or indicates a potential for hazardous drift, do not spray.

"Spray drift may be lessened by:

1. Applying a coarse spray.
2. Selecting the minimum spray pressure required to provide a uniform spray pattern and adequate plant coverage.
3. Using a spray boom no longer than 3/4 the wing or rotor length.
4. Directing spray nozzles directly to the ear of the boom when applying with aerial equipment.
5. Spraying only when wind velocities are low.
6. Adding Nalco-Trol or Sta-Put, or other approved spray thickening agent, to the spray mixture for applications near susceptible crops or ornamental plants. If a spray thickening agent is used, follow the use directions and precautions on the product label.

Application Timing and Crop Tolerance

"Rice is tolerant to postemergence applications of DowElanco Rice Herbicide from the 4-leaf stage to the 1/2" internode elongation stage of rice development. Postemergence applications of the higher rates of DowElanco Rice Herbicide may result in temporary rice injury that appears as leaf chlorosis or stunting. Rice will normally recover from these symptoms in two to four weeks. Treatments applied after the 1/2" internode elongation stage may result in increased rice injury. **Do not apply in the booting or subsequent stages.**

"**Repeat Applications:** Two applications may be made during the 4-leaf to the 1/2" internode elongation stage of development as long as the total amount of DowElanco Rice Herbicide does not exceed 2 pints (0.75 lbs. a.e.) per acre and applications are made at least 15 days apart.

"**Water Management:** For preflood applications, the rice should be in the 4-leaf stage or larger. A shallow flood may be applied 24 hours following the DowElanco Rice Herbicide application. If the weeds are drought stressed, flush the field before applying DowElanco Rice Herbicide so that weeds are actively growing at time of treatment.

For postflood applications, treatments should be made when weeds are well emerged above the water surface. Weeds submerged at the time of application will not be controlled. Weeds larger than 20-24% in size may not be adequately controlled. DO NOT raise water levels for 24 hours after the application.

"**Preharvest interval:** Do not apply later than 45 days before harvesting rice.

"**Tolerance of Rice Varieties:** DowElanco Rice HErbicide has shown selectivity when tested on the following rice varieties from the 4-leaf stage to the 1/2" internode elongation stage: Lemont, Newbonnet, Tebonnet, Mars, Skybonnet, Mercury, and Maybelle. DO NOT apply to Bond, Starbonnet, Lebonnet, V-4916, Katy, Allan, Jasmine, and Mill varieties."

Application Rates and Weeds Controlled

"DowElanco Rice Herbicide should be applied at rates of 0.67 to 1.0 pint (0.25 to 0.375 lb. a.e.) per acre to actively growing broadleaf weeds. Apply 1 pint for difficult to control species, when broadleaf weeds are large, or in post flood applications.

"Weed Control Information:

Weeds Controlled	Application Rate	Comments[1]
Indian Jointvetch Morningglory spp. Northern Jointvetch Smooth or Redroot Pigweed	0.67-1.0 pint/A (0.25-0.375 lb ai/A)	Jointvetch species are most susceptible to DowElanco Rice Herbicide from 10" to flowering stage of growth. Apply 1 pint/A when pigweed or morningglory runners aare greater than 6".
Alligatorweed Common Cocklebur Dayflower Eclipta Hemp Sesbania Redstem Smartweed spp. Texasweed Water Hyssop	1.0 pint/A (0.375 lb ae/A)	Tank mix with Blazer or propanil for maximum control of *Hemp sesbania* (coffeebean) or Texasweed. Tank mix with Basagran for maximum control of dayflower, eclipta, and smartweed.
Ducksalad Flatsedge spp.	1.0 pint/A (0.375 lb ae/A)	DowElanco Rice Herbicide will provide suppression of these weed species when tank mixed with propanil and/or Basagran.

[1]Best control is achieved with application prior to weed flowering. Weeds larger than 24" in size may not be adequately controlled. Post flood applications should be made when weeds are well emerged above the water surface. Weeds submerged at the time of application will not be controlled. "

TANK MIX RECOMMENDATIONS

"DowElanco Rice herbicide may be tank mixed with several rice herbicides for broad spectrum weed control in rice. Tank mix applications are to be used only when the rice is well established and in the recommended stage of growth for treatment with DowElanco Rice Herbicide and the tank mix product. For best results, weed species should also be in the proper stage of growth as specified on the DowElanco Rice Herbicide and tank mix product labels. When tank mixing, always follow the use directions and precautions in accordance with each herbicide label. No label dosage rates may be exceeded."

The section of the label on Application Timing and Crop Tolerance needs to be clarified. These instructions provide for application up to the 1/2" internode elongation stage of rice development. The stage of rice development where this occurs is referred to as Panicle Differentiation (PD) which is closely associated with "jointing" or the internode elongation stage. PD is equivalent to 1/2 to 3/4 inch internode elongation, where the panicle is 1 to 2 mm in length and branching of the panicle is visible to the naked eye. A similar expanded discussion should be added to the label to avoid any confusion which may occur between terminology and the size of the panicle and internode elongation. The section of the label on Application Rates and Weeds Controlled also requires clarification since it recommends application based on stages of weed growth rather than rice growth such as internode elongation or panicle size, which could result in misuse of the herbicide. These two label sections should be merged together with appropriate language ensuring that the growth stage of the rice rather than the weed is the determining factor in application. Also the PHI needs to reiterated here.

The proposed label for use on rice requires revision to clarify the latest recommended time of application, reiterate the PHI and to ensure that the proposed directions for application based on weed growth stage will not result in product misuse.

Nature of the Residue

Water

The nature of the residue in water is not adequately understood. For a permanent tolerance a 28 day radiolabeled water metabolism/degradation study under field conditions showing the fate of the herbicide is required. The water metabolism study should be conducted in a controlled environment in which the light intensity should mimic the lumens in a turbid and weed infested body of water at a depth of 10 feet (e.g. nearly dark conditions) and the ambient water temperature should not exceed 70°F. Alternatively, the petitioner may submit a proposed metabolic pathway under similar field conditions from available environmental fate studies.

Fish and Shellfish

The metabolism of triclopyr was discussed under PP#6G3306 (see February 26, 1985 memo of J. Worthington) as follows:

> The subject petition includes two triclopyr radiolabeled fish metabolism studies. In the first study, bluegills were exposed to a concentration of 2.5 ppm ^{14}C ring labeled triclopyr for 96 hours and then transferred to a flow through aquarium for a 72 hour depuration period. Samples of fish dissected into flesh and remainder (head, skin and viscera) were collected at 24, 48 and 96 hours during the uptake phase and at 6, 24, and 72 hours during the depuration phase.
>
> The levels of total activity in fish flesh appeared to plateau in approximately 24 hours. However, no plateau level was demonstrated for whole fish after 96 hours. The bioconcentration factor (concentration in tissue/ concentration in water) for whole fish was approximately 0.5 ppm, and approximately 0.03 for flesh. The levels of total activity did not significantly decline during the depuration period.
>
> Tissue samples were homogenized with 0.1 N sodium hydroxide and extracted with anhydrous ethyl ether. The ether layer was evaporated to dryness, redissolved in acetonitrile, the level of total activity determined, followed by analyses using HPLC

and TLC. The aqueous layer was acidified and reextracted with ethyl ether. The second layer was analyzed as the first described above. The levels of total activity were determined in the remaining aqueous fraction and the unextractable solids.

The combined ether layers for each sample through the course of the experiment contained approximately 90% of the activity in flesh (up to 0.12 ppm) and 60-80% of the activity in fish remainders (up to 1.63 ppm), respectively. Triclopyr, per se, and 2-methoxy-3,5,6-trichloropyridine were the major residues in the flesh portion accounting for at least 80% of the extractable activity. Small amounts of 3,5,6-trichloro-2-pyridinol (up to 16% of the activity) were also detected. Generally, the three compounds accounted for more than 92% of the organosoluble activity. The activity in the remainder portions was more evenly distributed between the three compounds. The three compounds accounted for approximately 80% of the organo-soluble activity in the fish remainder fractions.

The aqueous extractables contained about 2/3 of the remaining activity and the non-extractable solids the remaining 1/3. The aqueous extractable and the non-extractable residues, (8 to 15% of the flesh activity and 19 to 30% of the remainders activity, respectively) were not characterized.

The second radiolabeled study investigated the potential of triclopyr and its metabolites to concentrate in catfish. The experiment simulated the situation in which triclopyr treated soil is in contact with water in which catfish are feeding. Silt loam soil was treated with labeled triclopyr at a level of 1.25 ppm on a dry weight basis. Moistened soil containing ^{14}C-triclopyr was allowed to incubate for 30 days at 23°C. This soil was then placed in water and this mixture allowed to stand for 35 more days at 24°C. The catfish were then introduced to the system and sampled after 1 hr, 5 hrs and 12 hrs, and after 1, 6, 9, 12, 15, 18, 21, 24 and 27 days of exposure. The fish were divided into edible portion and remainder as described above.

Approximately 60% of the original activity applied to the soil decomposed during the 30 day incubation period. However, after the treated soil was submerged in water little additional degradation occurred. The initial level of activity in water when the fish were introduced was 0.022 ppm of which approximately 66% was parent compound. After 27 days the parent compound still accounted for 55% of activity in water. The levels of total activity were essentially the same. The major metabolite, 3,5,6-trichloro-2-pyridinol accounted for about an additional 25%. The levels of 2-methoxy-3,5,6-trichloropyridine in edible fish tissue ranged as high as 11% (or 2.4 ppm). There was little change in the relative proportions of the amount of the soil activity after submersion of the soil in water.

The total activity levels in the sampled fish appeared to plateau within the first day at about 1.3 to 18 times the concentration in the surrounding water. After the first day, 3,5,6-trichloro-2-pyridinol (accounting for 25-80%) was the major component of the residue. The levels of 2-methoxy-3,5,6-trichloropyridine ranged as high as 25% (or 4.2 ppm). Triclopyr, per se, generally only represented about 5-10% of the activity in edible fish tissue. The unidentified activity (unidentified polar compounds and the non-extractable activity) accounted for the remaining 30-50% of the residues.

The two fish radiolabeled studies demonstrate that for the purpose of the proposed temporary tolerance triclopyr, per se, and its two metabolites, 3,5,6-trichloro-2-pyridinol and 2-methoxy-3,5,6-trichloropyridine are the principle residues of concern. These two metabolism studies were conducted in the dark to eliminate the principle source of triclopyr degradation, photolysis. The levels of activity found in these studies do not reflect the levels anticipated from actual conditions.

The nature of the residue of triclopyr in fish/shellfish is not adequately understood for purposes of a permanent tolerance. Unidentified ^{14}C residues from the existing fish metabolism study accounted for as much as 53% of the total ^{14}C residues in fish remainder and identified triclopyr residues in fish remainder nearly doubled from a 48 hour to a 96 hour uptake.

A new Bluegill fish metabolism study conducted for a minimum of seven days (at 17°C as in the original Bluegill study) at an exaggerated rate (e.g. 2 to 4X/5 to 10 ppm) identifying at least 90% of the ^{14}C residues in edible fish tissue is required. The study must also identify residue plateaus and bioaccumulation factors. Acid, base and enzymatic hydrolysis procedures may be necessary to release conjugated and non-extractable residues. Confirmatory analyses (i.e. preferably GC/MS) are required for all identified metabolites. Radiolabeled validation of the proposed analytical methodology for the parent and metabolites using the ^{14}C residues must also be included in the fish metabolism study. A protocol for the fish metabolism study should be submitted to EPA for review.

CBTS notes that the petitioner has excluded the 3,5,6-tricloro-2-pyridinol metabolite in the proposed permanent tolerance expression for fish. The existing fish metabolism study identified up to 26% of the total ^{14}C residue in fish remainder as the 3,5,6-trichloro-2-pyridinol metabolite, and accordingly it may need to be included in the tolerance expression for fish (pending TOX deferral, see Conclusion No. 5.b.). It appears that an FAT for processed fish products, also including the 3,5,6-trichloro-2-pyridinol metabolite in the tolerance expression may be needed.

Plants

The nature of the residue in plants was most recently reviewed in the Triclopyr List B Inventory-Residue Chemistry prepared by Dynamac 1/10/90 and approved by CBRS and CBTS on 5/20/90 and 5/21/90, respectively. The conclusions are as follows:

> The qualitative nature of the residues of triclopyr in plants is not adequately understood because in studies reflecting foliar application of [^{14}C] triclopyr to grasses, significant proportions of the total radioactive residues (TRR) were in uncharacterized water-soluble polar unknowns (up to 40%) or non-extractable material (up to 80%).
>
> Data in MIRD 00127280 indicate that triclopyr, conjugated triclopyr and methoxy-trichloropyridine (thought to be a photodegradate taken up from the soil) accounted for 15 (29 ppm), 23 (43 ppm), and 12% (23 ppm) of the TRR, respectively, in grass clippings collected 7 days following application at 3 lb ai/A; 42 days posttreatment, these residues were 0.64, 3.31, and 0.12 ppm. Trichloropyridinol residues were 0.25 ppm on day 7 and <0.01 ppm (nondetctable) 42-370 days posttreatment. Non-extractable residues accounted for 27% of the TRR in samples collected 7 days posttreatment and reached a maximum of up 80% 123 days after treatment. Polar residues comprised 19% of the TRR in 7-day samples and 30-40% in samples collected at posttreatment intervals of up to 371 days. It was reported that treatment of the polar residue fraction with 1.5-2 N hydrochloric acid failed to release any organosoluble radioactivity (the duration and conditions of the acid hydrolysis procedure were not reported); otherwise, the polar and nonextractable residues were not characterized.
>
> The limited data available from an additional crop study (MIRD 40356607) indicate that triclopyr is taken up from soil and translocated to stems and leaves of wheat. Residues were 0.23 ppm in or on wheat straw harvested 36 days following soil application; the report stated that the residues were primarily polar and were not characterized.
>
> An adequate data base on the metabolism of triclopyr in plants would consist of acceptable studies on grasses. Until an adequate data base on plant metabolism is available, the adequacy of data pertaining to the other residue chemistry topics cannot be determined for triclopyr.

Accordingly, for these permanent tolerance petitions the nature of the residue in plants (i.e. rice and irrigated crops) is not adequately understood. A decision on the nature of the residue in rice is deferred until the required grass metabolism data and for plants until the required three metabolism studies (i.e. see Irrigated Crops below) are submitted and reviewed.

Irrigated Crops

Separate plant metabolism studies for irrigated crops are not generally required, where adequate plant metabolism studies depicting the nature of the residue in a minimum of three representative crops are available. However, for triclopyr metabolism data on three crops are not available. Tentatively, the required grass metabolism study will satisfy one of the required studies. Additional metabolism studies representing a root vegetable and a fruit are required. In accordance with the Guidelines, if the results of the three metabolism studies on the above dissimilar crops indicate a similar metabolic route in the three crops, then additional metabolism studies will not be required.

Animals

The nature of the residue in animals was most recently reviewed in the Triclopyr List B Inventory-Residue Chemistry prepared by Dynamac 1/10/90 and approved by CBRS and CBTS on 5/20/90 and 5/21/90, respectively. The conclusions are as follows:

> The qualitative nature of the residue in animals is not adequately understood because the data submitted on ruminant (goat) metabolism (MIRD 00172280) reflect preconditioning the animal with unlabeled triclopyr at 2,000 ppm for 10 days followed by dosing with ^{14}C triclopyr at 2,000 ppm for 1 day; preconditioning of test animals is not acceptable and guidelines specify dosing with radioactive material for a minimum of 3 days. It was reported that 95% of the radioactive dose was excreted in the urine. Total radioactive residues (TRR) were 2.63 ppm in liver, 8.33 ppm in kidney, 0.34 ppm in muscle, and 0.32 ppm in fat. The maximum TRR in whole milk and milk fat were ca. 0.2 and 0.5 ppm, respectively. Residues identified in milk were free (47% of the TRR) and conjugated (20%) triclopyr and trichloropyridinol (27%). Trichloropyridinol was identified as 86% of the TRR in fat, 89% in muscle, 83% in liver, and 60% in kidney; 15% of the TRR in kidney was unchanged triclopyr. Compounds were identified by HPLC and identities confirmed by GC/MS.
>
> An additional study (MIRD 00071805) reflects dosing at a level equivalent to ca. 10 ppm in the diet; based on the established tolerance for residues in or on grass forage,the dietary burden could be as high as 375 ppm for beef cattle and 350 ppm for dairy cattle.
>
> Data were also submitted on poultry metabolism (MIRD 40356606); since there are no poultry feed items with tolerances established for triclopyr residues, these data are not considered relevant to the reregistration of triclopyr at this time.

The Phase 4 Review of triclopyr required the following animal metabolism data.

> The poultry study referenced is irrevelent since grass forage and grass hay are not poultry feed items. For the ruminant metabolism study in progress, triclopyr acid, BEE, or TEA (preferably the form least rapidly excreted, if known) labeled in the ring portion of the molecule must be fed to the livestock for a minimum of three days. Orally treated test animals must be sacrificed within 24 hours of the final dose. The dose administered and the specific gravity must be high enough to allow for adequate identification of the metabolites/degradates. The tissues from the metabolism study must be tested using the data collection and enforcement analytical method for radiovalidation purposes.

Accordingly, for this permanent tolerance petition the nature of the residue in ruminants is <u>not</u> adequately understood. The petitioner should note that the ruminant metabolism study must also include adequate characterization of residues in milk and milk fat. A decision on the nature of the residue in poultry is <u>deferred</u> until the new poultry metabolism study submitted under PP#1F03991 for use on rice is reviewed.

The poultry metabolism study was reviewed under PP#8G3571 for proposed temporary tolerances on rice (see 1/20/88 memo of M. Metzger) as follows:

> "Three groups of 5 laying hens were orally dosed with ^{14}C-triclopyr (labeled at C2 and C6 of ring, 98% radiochemical purity, 2.84 mCi/mmol) in gelatin capsules corresponding to approximately 9 ppm in their diets for 10 days. One control group of 5 hens received placebo capsules. Eggs and excreta were collected each day, and egg yolks, eggs whites and excreta were individually pooled for each group. Birds were sacrificed at 22-24 hours following the final dose, and tissue samples were collected and individually pooled by group. All samples were then sub-sampled for ^{14}C residue analysis, and then frozen. Total ^{14}C-activity was determined for each group by LSC.
>
> "Excreta residues were extracted X3 with acetonitrile/water (1/1), the combined extract diluted to 100 mls, and ^{14}C-activity determined on a 1 mL aliquot by LSC. Following filtration, residues were characterized by co-chromatography (reverse-phase HPLC) with reference standards. A portion of the excreta extract was further cleaned up by solvent partitioning, derivatized with diazomethane, and analyzed by both HPLC and GCMS.
>
> "Liver and kidney samples were homogenized in acid solution and extracted X3 with ethyl ether. The pellet was isolated from the aqueous layer and extracted X3 with ethyl ether. The combined ether extract from the pellet extraction was diluted to 100 ml, and total ^{14}C-activity was determined for this

extract and for the pellet by LSC. The initial combined ether extract was extracted X3 with 0.1 M sodium bicarbonate solution, and the ether layer was discarded. Following acidification and ether extraction, the pooled ether extracts were diluted to 100 ml, an aliquot was taken for LSC, and the remaining portion was concentrated and analyzed by reverse-phase HPLC. A slightly modified extraction scheme was used for skin samples and other kidney samples which included homogenization after each extraction of the pellet, and a base treatment step prior to homogenization of the pellet to free any remaining unextracted radioactivity. Additionally, the final pellet extract was analyzed by reverse-phase HPLC.

"Only tissue samples with ^{14}C-activity greater than 0.1 ppm were analyzed by HPLC (kidney, Groups III and IV; liver and skin, Group IV). Only excreta samples were analyzed by GCMS. The reported recoveries as a percent of total dose ranged from 77.4-86.2%. Recoveries of ^{14}C-triclopyr from the various tissues analyzed ranged from 92.7-106%. Residue levels in eggs (yolks and whites determined separately) plateaued at about day 8 of the study. The limit of quantitation in these studies was 0.002-0.003 ppm." The residues (total ^{14}C-activity) in each tissue type are shown below.

Tissue Type	Average Residue (Total ^{14}C-activity, ppm)	
Egg yolk	0.02	(0.16% of total recovered ^{14}C-activity)
Egg white	0.007	(0.06%)
Excreta	11.0	(89.7 %)
Blood	0.2	(0.02%)
Skin	0.07	(0.57%)
Breast muscle	0.01	(0.08%)
Thigh muscle	0.02	(0.16%)
Liver	0.09	(0.73%)
Heart	0.03	(0.24%)
Fat	0.06	(0.49%)
Gizzard	0.06	(0.49%)
Kidney	0.70	(5.7 %)

"Analysis of excreta showed a major HPLC peak with a retention time similar to parent triclopyr. The identity of this peak was confirmed by derivatization to triclopyr methyl ester and analysis by GCMS. Residue in tissue (liver, kidney and skin) were identified by comparing their HPLC retention times with the retention times of authenticated reference standards. The major peak again in each case was parent triclopyr. However, analysis of the kidney pellet extract showed the presence of 3 components with retention times corresponding to triclopyr, its pyridinol metabolite, and an uncharacterized compound. The submitter attributes the presence of the metabolites to the base hydrolysis step in the extraction procedure rather than to metabolism of triclopyr in the hen. To support this, hen kidney tissue from a control bird was spiked with ^{14}C-triclopyr and treated with hot base. The resulting extract showed a similar residue pattern to that for the treated hen kidney samples. The fact that hot base treatment produces and HPLC residue pattern similar to that for treated hens does not prove the absence of the two metabolites in treated hens. The goat metabolism studies previously reviewed showed 3,5,6-trichloro-2-pyridinol to be the major metabolite in goat tissue. Therefore, we will accept the results of this study as adequate for the purposes of this EUP and these Temporary Tolerance, and conclude that parent triclopyr is the major residue found in poultry tissue and eggs. However, the following additional data will be required for a permanent tolerance or for a Section 3 registration:

(a) Data showing the absence of triclopyr metabolites in poultry kidney. Reanalysis of kidney tissue using enzymatic hydrolysis in the extraction procedure should be considered.

(b) If triclopyr metabolites are found to be present in poultry tissues, all major components of the residue should be characterized."

EPA does not currently regulate poultry kidney and accordingly further characterization of C14 kidney residues is not required. Although, not characterized C14 residue levels in eggs and muscle were 0.02 and 0.01 - 0.02 ppm, respectively from a 9 ppm dosage level or approximately a 10X feeding level (i.e. including residues in both poultry water and feed). The metabolism study was conducted for 10 days or three times the minimum three day interval required, thus allowing for possible additional bioaccumulation and higher C14 residues. C14 residues in liver, kidney and skin were identified by comparing their HPLC retention times to the retention times of authenticated reference standards with the parent triclopyr the major peak in each case.

For purposes of these petitions and their proposed tolerances the nature of the residue in poultry is adequately understood and consist of the parent triclopyr.

Analytical Methods

Water

Under PP#1F03935 the petitioner has proposed two methods:

- Determination Of Triclopyr And 3,5,6-trichloro-2-Pyridinol In Water By Gas Chromatography; Research Report ACR 84.3, 2/10/84

- Determination Of Triclopyr; 3,5,6-Tricloro-2-Pyridinol and 2-Methoxy-3,5,6-Trichloropyridine In Water By Gas Chromatography' Research Report ACR 76.8; 10/18/86.

CBTS notes that the petitioner is presently only proposing to include the parent and the 2-methoxy-3,5,6-trichloropyridine metabolite in the tolerance expression for water. A decision on the adequacy of the proposed analytical methodology for triclopyr and its metabolites in water is deferred until the nature of the residue in water is determined (see Nature of the Residue In Water).

Fish/Shellfish

The proposed analytical methods for detecting triclopyr and its 3,5,6-tricloro-2-pyridinol in fish were discussed in PP#6G3306 (see May 13, 1986 memo of L. Cheng) as follows:

> Two methods (ACR 77.4 and ACR 70.19R) and their addenda (ACR 77.4.S1 & ACR 70.19R.S1, respectively) were attached. Method ACR 77.4 [Determination of Triclopyr ((3,5,6-trichloro-2-pyridinyloxy)acetic acid); 3,5,6-trichloro-2-pyridinol and 2-methoxy-3,5,6-trichloropyridine in Grass by Gas Chromatography] was successfully tested in a method trial (see R. Perfetti's memo dated December 29, 1983, PP1F2508). Method ACR 70.19R entitled "Determination of Residues of 3,5,6-trichloro-2-pyridinol in Bovine Tissues by Gas Chromatography" is similar to the part for the determination of 3,5,6-trichloro-2-pyridinol in Method ACR 77.4. Minor modifications such as larger size bottles (8 oz versus 4 oz), a higher concentration (0.1 ppm) of standard, amounts of reagents added and removal of external heating (ACR 77.4.S1), and an extra clean up step in ACR 70.19R.S1 were made. Validation data on fish were included in ACR 77.4.S1 in which 76%, 84% and 88% recoveries were obtained at 0.1 ppm fortification levels of triclopyr. Recovery data on 3,5,6-trichloro-2-pyridinol were included in ACR 70.19R.S1. These were 98% (3 values) and 102%, 88% and 91% at 0.1 ppm, 0.5 ppm, and 1 ppm respective spike levels in fish samples. "........................

The nature of the residue of triclopyr in fish/shellfish is not adequately understood for purposes of permanent tolerances. A new Bluegill fish metabolism study is required including radiolabeled validation of the proposed analytical methodology for triclopyr and its metabolites in fish (see Nature of the Residue in Fish/Shellfish). The petitioner should note that inclusion of both the 3,5,6-trichloro-2-pyridinol and 2-methoxy-3,5,6-trichloropyridine metabolites in the tolerance expression for fish/shellfish and appropriate methodology and recovery data may be required (see Conclusion No. 5.b. for TCP).

A decision on the need for new analytical methodology for fish/shellfish is deferred pending review of the required new fish metabolism study.

Plants/Irrigated Crops/Animals

The analytical methods in plants/irrigated crops and animals was most recently reviewed in the Triclopyr List B Inventory-Residue Chemistry prepared by Dynamac Inc. 1/10/90 and approved by CBRS and CBTS on 5/20/90 and 5/21/90, respectively. The conclusions are as follows:

> Adequate methodology is available for the enforcement of tolerances for triclopyr residues in or on grass and animal commodities. Two GC/electron capture detector (ECD) methods are listed in Pesticide Analytical Manual (PAM) V01. II as Method I (Dow Chemical Co. Method ACR 77.4) for the determination of triclopyr residues in or on grasses, and as Method II (Dow Chemical Co. Method ACR 77.2) for the determination of residues in milk, cream, and animal tissues (Pesticide Reg. Sec. 180.417). Recoveries of triclopyr, metabolite I (3,5,6-trichloro-2-pyridinol), and metabolite II (2-methoxy-3,5,6-trichloropyridine) from grass samples using Method I were 86-90%, 98%, and 98%, respectively. Recoveries of triclopyr residues from milk and animal tissue samples using Method II were 66-98% and 80-116%, respectively. The acid/phenol standard (Std. No. 6786) for triclopyr is completely recovered (>80%) from fatty and non-fatty foods using the PAM Vol. I FDA Multiresidue Protocol B for chlorophenoxy acids and pentachlorophenol (Section 221.1 and Table 210-D). No standard reference material is available for the ester/ether, and recoveries must be calculated against the methylated acid/phenol derivative according to the method. Similar GC/ECD methods have been used for the collection of data concerning grass, swine, and cattle commodities. The Pestrak data base dated 12/13/89 indicates that recovery of triclopyr using PAM Vol. I FDA Multiresidue Protocols A, D, and E is unlikely: Protocol D has been targeted for study in the determination of metabolite II.
>
> It should be noted that in both Methods I and II diazomethane is used to derivative triclopyr residues to volatile triclopyr methyl esters prior to GC/ECD analysis, and benzene is used to extract metabolite I in Method I. The use of diazomethane and benzene generally does not satisfy Agency guidelines pertaining to methodology used for data collection and tolerance enforcement.

We note that current CBTS policy is to accept the use of benzene and diazomethane in proposed analytical methods if the registrant offers a reasonable justification.

Residues in rice of triclopyr and the pyridinol metabolite are determined by Methods ACR 84.2 and ACR 84.4 respectively with minor modifications. A new analytical method was developed to determine residues of 2-methoxy-3,5,6-trichloropyridine in rice grain and straw. Briefly, the sample is homogenized in acid and extracted with hexane. An aliquot of the hexane layer is then washed with sodium hydroxide solution and analyzed by capillary GC using an electron capture detector. The validated lower limit of quantitation for triclopyr was 0.05 ppm and 0.01 ppm for 2-methoxy-3,5,6-tricloropyridine. Fruit and vegetable samples from irrigated crops were analyzed for residues of triclopyr using modifications of methods ACR 77.5 ACR 84.4 with a lower validated quantitation level of 0.05 ppm. Some of the water samples were analyzed for triclopyr using modifications of method ACR 76.8 with a lower validated quantitation level for these two methods of 0.01 ppm.

Although, adequate analytical methodology is available for currently identified triclopyr residues in plant commodities (i.e. triclopyr, 3,5,6-trichloro-2-pyridinol and 2-methoxy-3,5,6-trichloropyridine), and triclopyr residues in animal commodities (i.e. triclopyr and triclopyr and 3,5,6-trichloro-2-pyridinol), a final decision must be deferred until the nature of the residue in plants and animals is adequately understood; if additional metabolites are identified new analytical methodology may be required. Fortification and recovery data for the proposed analytical methodology for irrigated crop residues is also required. Additionally, the petitioner must also submit a justification for the use of diazomethane and benzene if acceptable alternatives are not available. Copies of all the final analytical methods including all modifications will be required.

Residue Data

Storage Stability

The storage stability data requirements were discussed in the Phase 4 review for triclopyr as follows:

> The storage stability studies in progress must include all crops and processed products for which a field trial and/or processing study has been (or will be) conducted, as well as representative livestock commodities. Use of field-weathered samples is strongly recommended. Storage conditions must reflect the conditions of the treated samples (from the field trial and processing studies) with respect to temperature, length of storage, containers, lighting, etc. The TEA salt of triclopyr and all metabolites and/or degradates included in the tolerance expressions must be included as well. Translation of data reflecting storage of samples treated with the butoxyethyl ester of triclopyr is not appropriate. The chosen intervals must allow for unforseen delays in sample storage.

The above storage stability data requirements also apply to this petition.

In the current submission preliminary storage stability data from the Residue Research Group indicate stability of triclopyr under frozen conditions in apples, water, poultry muscle, liver and eggs for 612, 556, 435, 410, and 397 days, respectively and stability in vetch green forage for over 5 years. A copy of the final report is required.

Water Residue Data

Residue data for triclopyr in water was first discussed in PP#6G3306 (see February 26, 1985 review of J. Worthington) as follows:

> Triclopyr was applied to two lakes by direct injection of 1.0 and 2.5 ppm for the control of watermilfoil. The application rates correspond to approximately 1.5 times the maximum proposed rate. Water and sediment samples were taken in and around the treatment area on days 1, 7, 14, and 28. Initial residues were detected at levels as high as 0.41 ppm (after the application of 1.1 ppm). After seven days the highest values reported was 0.02 ppm. All subsequent samples showed non detectable levels (<0.01 ppm). The available residue data indicate that residues in potable water could approach 0.5 ppm shortly after treatment. It is RCB's judgement that the proposal of 0.5 ppm tolerance for residues in potable water is needed to cover residues resulting from lakes and pond uses.
>
> Triclopyr was also applied to ditch banks at rates up to 3.0 lbs. a.e. per acre. Water samples from the waters edge and midstream were collected at the treatment site and at intervals up to five miles downstream. Triclopyr was detected five miles downstream at levels approaching 0.36 ppm; however, no detectable residues were reported after day 1.

The Lake Seminole, Florida (MIRD# 41714304) and Banks Lake, Washington (MIRD# 41714305) water residue studies were submitted to EFED to satisfy Field Dissipation - Aquatic (sediment) and Aquatic Impact (164-2) data requirements. The following is a summary of the 4/14/92 EFED reviews:

Lake Seminole, Georgia Field Study

> This portion of the submitted study cannot be used to fulfill the Aquatic (sediment) Field Dissipation data requirement at this time.
>
> Triclopyr dissipated with calculated half-lifes of 0.5 and 3.5 days in the surface waters of plots located in the Spring Creek Arm of Lake Seminole, Georgia, following a surface and aerial application, respectively, of triclopyr triethylamine salt (Garlon 3A, 32.2% triclopyr acid equivalent by weight) at 2.5Mg a.e./ml on July 9, 1986. The degradate 3,5,6-trichloro-2 pyridinol (TCP) was not detected (<0.05 ppm) in surface or bottom water after 1 day post-treatment. Triclopyr was detected in the sediment layer (up to 5-10 cm deep) immediately post-treatment, but was <0.10 ppm (detection limit) at all other sampling intervals; TCP was not detected (<0.05 ppm) at any interval.

In order for this portion of the study to fulfill the aquatic and aquatic impact field dissipation data requirements, you must submit the storage stability data for triclopyr and TCP for the maximum length of storage in ther water and sediment substrates; rainfall and air temperature data for the study period; and a complete characterization of the sediment.

Banks Lake, Washington Field Study

This portion of the submitted study cannot be used to fulfill the Aquatic Field (sediment) Dissipation data requirement at this time.

Triclopyr dissipated with half-lives of <1 day in the surface and bottom water of plots (660 x 500 feet) located in Banks Lake, Washington, following a surface (boat) or aerial (helicopter) application of triclopyr triethylamine salt (Garlon 3A, 32.5% triclopyr acid equivalent by weight) at 2.5 pg a.e./ml on August 4, 1987. The degradate 3,5,6-trichloro-2pyridinol (TCP) was not detected (0.05 ppm) in surface or bottom water at any sampling interval. Triclopyr and TCP were not detected (<0.10 and <0.05 ppm, respectively) in the sediment layer (up to 5-10 cm deep) at any sampling interval.

Since the meteorological conditions which occured following application of the test substance were atypical and not representative of conditions that would normally occur, the problems with this study cannot be resolved with the submission of additional data. A new study must be conducted.

Neither of these studies satisfy CBTS requirements for water residue field trials for the reasons cited in the above EFED reviews (i.e. without sediment data requirements) and more specifically since the studies do not adequately represent typical field conditions. The treatment area for the Lake Seminole study was at the confluence of several small streams, making exact determination of water flow rate and direction difficult and for the Banks Lake study the high winds present on the reservoir in the hours after application, caused significant movement of water within the treatment and buffer area.

The petitioner should attempt to the design the field trials to represent likely field conditions including moderate to heavy weed growth at the various use sites proposed. Since the half-life of triclopyr is highly dependent on light conditions (i.e. half-life of 0.5 days, 1.2 days, and 4.7 months under sterile buffered conditions, natural river water and dark aerobic conditions, respectively) the degree of weed growth, depth, light intensity, temperature, mixing etc. are variables which should be reflected in the field trial data. Residue data at various distances from the application sites and time periods after application will be required to support proposed labeling restrictions for time and distance restrictions for potable water intakes.

The current submission includes a study "Persistence of Hexazinone (Velpar), Triclopyr (Garlon), and 2,4-D in a Northern Aquatic Environment, April 18,1988" (MIRD# 41714306, a copy of which appeared in J. Agric. Food Chem. 1988. 36, 1314-1318. Small enclosures were treated with triclopyr (Garlon 4E butoxyethanol ester, 48% a.e.) at rates equivalent to 0.3 and 3.0 kg/ha (.27 and 2.7 lbs/A). A relatively large proportion of the pesticides was absorbed to the enclosure walls. For triclopyr the times for 50% and 95% dissipation from the two application rates was 3.8 to 4.3 and 15.0 to 15.9 days, respectively. This study does not represent field conditions and therefore although informative, does not satisfy water field trial residue data requirements.

A study "Residue Study Of Water And Sediment Samples Following Ditch Bank Application Of Garlon 3A Herbicide (XRM-3724)" dated April 19, 1989 [MIRD No. 417143-03] was included in the previous submission. The study included residue data from the application of triclopyr using ground equipment (formulated as the triethylamine salt) at a rate of 3 gallons/acre) to ditch banks in Arizona, California, Florida, Georgia, Texas, and Washingtion. Water and sediment samples were collected at sampling points 1 meter, 1 mile, and 5 miles downstream from each test plot at the day of application, and at 1, 2, and 4 days after application.

All samples were shipped frozen from the test locations to Dow Chemical Laboratories. Analytical Method ACR 84.3 (see Analytical Methods for method details) was used to determine triclopyr and TCP in water by gas chromatography with triclopyr and TCP recoveries ranging from 78 - 120% and 92 - 110%, respectively; and ACR 84.2 was used to determine triclopyr and TCP residues in sediment with recoveries ranging from 83 - 112% and 71 - 114%, respectively.

Over 300 water samples were analyzed and the metabolite TCP was detected in only one sample at a level of 0.013 ppm; while triclopyr was either not detected or present at a level at or (usually) below 0.075 ppm, in all but six samples with reported levels from 0.205 to 0.499 ppm. A reference chart depicting where the samples were from was not provided, however the discussion infers that the higher residue levels were from the sampling station located 1 meter downstream. The petitioner's conclusions indicated that 0.330 ppm was the highest reported residue of triclopyr found in water and that TCP was not detected in any water sample, however an explanation of the actual reported residue levels discussed above was not provided. Triclopyr and TCP residue levels in sediment were mostly non detectable with positive samples as high as 0.029 ppm and 0.028 ppm, respectively.

Because the water residue levels in this new ditch bank study appeared inconsistent with those reported in the original ditch bank study (i.e. triclopyr residues were detected as high as 1.8 ppm at the treatment site and 0.36 ppm, 5 miles downstream) reviewed by J. Worthington in the above discussed review, a more detailed investigation was undertaken to determine the reason for the discrepancy in the results of the two ditch bank studies. The only rationale uncovered appears to be that unlike the original study the new ditch bank study provided for application as follows:

Specific instructions were given in the study protocol to minimize overspray of ditches or canals, as would be standard practice for bank treatments.

The petitioner should provide a copy of the specific instructions which were given in the study protocols, so a determination of their practicality and consistency with the proposed label can be made. The petitioner should also provide a detailed explanation of the inconsistent residue results of the two studies. Tentatively, CBTS concludes that the lower residue levels reported in the new ditch bank study result from more careful application procedures minimizing overspray and resulting water residue levels. However, current CBTS policy is that application instructions prohibiting overspray on water (particularly for helicopter and boat application), during ditch bank application, are impractical.

Accordingly, additional field trial data on ditch bank application representing all the proposed treatment methods (e.g. helicopter, boat, backpack, truck, etc.) and reflecting commercial application techniques are required to ensure that the proposed action level for triclopyr and its metabolites in potable water of 0.5 ppm, adequately cover water residues from ditch bank application.

In conclusion, the nature of the residue in water is not adequately understood. A 28 day radiolabeled study under field conditions showing the fate of triclopyr is required. Also, extensive studies on both stagnant and moving bodies of water providing additional geographically representative field trial data on the residue of triclopyr and its metabolites in potable water, reflecting the various application procedures and label restrictions proposed (or the label revisions we have suggested) on all use sites are needed to support the proposed potable water action level and fish/shellfish tolerances. CBTS notes that per PP#7G3306 (see April 9, 1991 memo of D. McNeilly) CBRS recommended approval of a proposed EUP for triclopyr which included aquatic use on 2,040 acres in 22 States.

Rice Residue Data

Residue data on rice submitted in support of proposed temporary tolerances were summarized under PP#8G3571 (see 1/20/88 and 6/16/88 reviews of M. Metzger, respectively) as follows:

Review of 1/20/88

"No storage stability data were submitted with this petition, nor were the time intervals between harvest and analysis, or all of the storage and transport conditions specified. This information must be submitted for all matrices and metabolites associated with this use.

"Residue data for rice grain and straw submitted with this EUP are summarized in the Table below. These data reflect 1 application of Garlon® 4E. No residue data are available for the plant metabolite 2-methoxy-3,5,6-trichloropyridine (which accounts for 12% of the total ^{14}C-activity at a 7-day PHI in the grass metabolism study). Total volume applied per acre and application method were not specified in the Italian studies. In the 2 samples taken from Mississippi, applications were made in 20 gallons per acre using a backpack sprayer.

Triclopyr Residue in Rice

	Application		Residue Range (ppm)			
	Rate	PHI Range	Grain		Straw	
Location	(lbs.a.i./A)	(Days)	Triclopyr	Pyridinol	Triclopyr	Pyridinol
Italy	0.48	97, 98	<0.1	-	<0.1-0.18	-
	0.64	98-106	<0.1	-	<0.1-1.43	-
MS	0.38	81	0.04	0.06	-	-
	0.50	81	0.04	0.08	-	-"

Review of 6/16/88

"Residues of triclopyr and the pyridinol metabolite were determined by Methods ACR 84.2 and ACR 84.4 respectively with minor modifications.

"A new analytical method was developed to determine residues of 2-methoxy-3,5,6-trichloropyridine in rice grain and straw. Briefly, the sample is homogenized in acid and extracted with hexane. An aliquot of the hexane layer is then washed with sodium hydroxide solution and analyzed by capillary GC using an electron capture detector.

"Recoveries of triclopyr from rice grain and straw ranged from 65-116% at 0.05-20.0 ppm fortification levels. Recoveries of the pyridinol metabolite from rice grain and straw ranged from 63-114% at 0.05-0.50 ppm fortification. Recoveries of 2-methoxy-3,5,6-trichloropyridine from rice grain and straw ranged from 92-120% at 0.01-0.10 ppm fortification.

"Residue data are summarized in Table 1.

Table 1: Residues of Triclopyr and Its Metabolites in Rice Grain and Rice Straw

Commodity	Application Rate (lbs ai/A)	PHI (Days)	Combined Residue (ppm)
Rice grain	0.5	42 - 50	ND - 0.088 (12.307)
		55 - 65	0.026 - 0.172
		70, 87	ND, 0.029
	0.38 + 0.38	42 - 50	ND - 0.060 (12.771)
		55 - 65	ND - 0.079
		70, 87	ND, 0.038
Rice straw	0.5	42 - 50	0.062 - 10.558
		55 - 65	1.22 - 3.059
		70, 87	1.130, 3.783
		42 - 50	0.070 - 5.970
		55 - 65	0.039 - 0.797
		70, 87	3.206, 3.548

"Eleven residue trials were carried out in 5 states (AR, CA, LA, MS, TX) with applications made using both ground and aerial equipment. Either a single application at 0.5 lbs. a.i./A or split applications at 0.38 + 0.38 lbs. a.i./A were made. Samples were frozen and transported to the laboratory where they were milled and stored frozen for periods of 6-14 months prior to analysis. No storage stability data were submitted.

In summary the above rice field trial data discussed in the 6/16/88 review of M. Metzer is geographically representative including seven sites for the single 0.51 lb a.i./A and six sites for the double application of 0.38 lbs a.i./A, not counting the Richvale, California site. Residue data on another California site (Biggs) were included in the study. The high triclopyr corrected residue levels in the rice grain (i.e. 14.0 and 14.5 ppm) and rice straw (i.e. 10.5 and 6.5 ppm) from the Richvale site are inconsistent with the other field trial residue data.

Narrative in the current submission indicates that for the field trials conducted at the single 0.51 lb a.i./A rate, application was 7-14 days following panicle initiation but prior to booting; and for the two applications of 0.38 lbs. a.i./A treatment at the 3 to 4 leaf stage and treatment again 7-14 days following panicle initiation. However a new summary table in the current submission (Table 1 - Triclopyr Rice Grain Residue Summary) indicates the PHI from the single application field trials was from 59 to 120 days, which appears inconsistent with the residue table in Appendix 1 of the current submission, which includes two treatment dates for the single application field trials. Utilizing the later treatment dates results in lower PHI's and appears more consistent with the narrative claiming that application was 7-14 days following panicle initiation. The petitioner needs to clarify this discrepancy.

We note that the petitioner has changed the PHI to 45 days in response to the following deficiency noted in the 6/16/88 EUP review of M. Metzer:

> "The proposed label includes a 60 day PHI. This is not consistent with other label directions which state that applications can be made up to panicle initiation plus 14 days. The period from panicle initiation plus 14 days to harvest could range from approximately 50-63 days. If a 60 day PHI is desired, the latest that pesticide application should be is approximately panicle initiation plus 4 days. If applications are to be made up to panicle initiation plus 14 days, the PHI should be decreased from 60 to 50 days.

The PHI's for the multiple application field trials ranged from 44 to 87 days (i.e. 87, 44, 55, 65, 42, 70, 50, 44, and 44 days) and although in some cases were longer than the proposed 45 day PHI, provide adequate representation considering variable growing conditions. The field trial include some aerial application data but current EPA policy is not to require aerial application data where adequate ground application data is available, provided aerial applications are made in a minimum of 2 gallons of water per acre (except tree crops). The proposed aerial use provides for use in a minimum of 5 gallons per acre. The field trial treatments reflect the proposed use of up to two treatments at from the 4-leaf stage to the 1/2" internode elongation stage not to exceed a total of 0.75 lbs. a.e./A. The uncorrected triclopyr and metabolite residues in rice grain varied from ND to 0.172 ppm and in rice straw from 0.070 to 5.970 ppm, without the Richvale site. The petitioner has proposed tolerances for triclopyr and its metabolites if 0.3 ppm in rice grain and 8 ppm in rice straw.

The nature of the residue in rice is not adequately understood. A final decision on the adequacy of the current rice field trial data for permanent tolerances cannot be made until an acceptable grass metabolism study, storage stability data and clarification of the PHI's for the single application field trial data are provided. A revised Section F raising the proposed tolerance in rice straw to 10.0 ppm is also tenatively required, pending resolution of the above issues.

Fish/Shellfish Residue Data

Aquatic field dissipation data for triclopyr was discussed under PP#7G3306 (see April 9, 1991 review of D. McNeilly) as follows:

> Two aquatic field dissipation studies of residues of triclopyr are available (from the original EUP request and also in the unreviewed petition PP#1F3939).
>
> Triclopyr was applied to two lakes by direct injection and aerial application at 2.5 ppm triclopyr acid equivalent to control herbaceous weeds. Water, sediment, aquatic plants, fish and clams/crayfish samples were taken both in and out of the treatment area one day prior to treatment and at the following intervals: 1 hour, 4 hours, 8 hours, 1 day, 3 days, 8 days, 12 days, 14 days, 21 days, and 42 days. The following is a discussion of the results at each of the experiment sites.
>
> Banks Lake, Washington.
>
> No bioaccumulation of triclopyr or trichloropyridinol (TCP) in fish tissue was detected. Additionally, no residues of triclopyr or TCP were detected> Additionally, no residues of triclopyr or TCP were detected in clams or crayfish. It should be noted that previous studies have reported a slight bioconcentration of triclopyr residues in fish tissues.
>
> Lake Seminole, Georgia.
>
> No bioaccumulation of triclopyr or TCP in fish tissue was detected. Peak levels of triclopyr residues in clams were observed at day 1 sampling and were as high as 3.44 ppm. Residue levels declined to <0.10 ppm by day 8.
>
> Crayfish had higher levels of residues than fish or clams. Crayfish were analyzed as a whole organism including the shell. Maximum residue peaked at 4 hours after spraying and were 0.25 - 4.87 ppm. Residue levels declined to 0.18 - 0.30 ppm by day 21, a much slower degradation. DowElanco states that most of the residue was in the shell and hemolymph both of which are non-edible portions of the crayfish.
>
> CBRS accepts this explanation for the purposes of the temporary tolerance only. For a permanent tolerance data must be provided to support this conclusion.

The Lake Seminole, Georgia study (MIRD# 41714304) was also recently reviewed in a recent EFED review (see 4/14/92 review of E. Regelman) in response to Field Accumulation - Aquatic Non-target Organisms (165-5) as follows:

This portion of the study cannot be used to fulfill the Accumulation in Aquatic Non-target Organisms data requirement at this time.

Triclopyr accumulated in caged crayfish and indigenous clams located in two plots of the Spring Creek arm of Lake Seminole, Georgia, that received a surface or aerial application of triclopyr triethylamine salt (Garlon 3A, 32.2% triclopyr acid equivalent by weight) at 2.5 ug a.e./ml on July 9, 1986. Triclopyr was detected at maximum concentrations of 1.86 ppm in whole crayfish tissue and 3.44 ppm in edible clam tissue at 1 day post-treatment. TCP was detected at a maximum of 0.49 ppm in crayfish at 14 days post-treatment, but was <0.06 ppm in clam tissue at all intervals. Triclopyr did not accumulate (<0.01 ppm) in sporting fish (bluegill, sunfish, perch, bass, war mouth, cracker, and shad) or bottom feeding fish (sucker and bullhead catfish); TCP was detected in some fish.

In order for this portion of the study to fulfill the aquatic non target organisms field accumulation data requirement, you must submit storage stability data for triclopyr and TCP for the maximum length of storage in the water, sediment, fish, crayfish, and clam substrates. The rainfall and air temperature data foe the study period and a complete chacterization of the sediment should also be submitted.

The Lake Seminole study does not satisfy data requirements for the magnitude of the residue in fish/shellfish for the reasons cited above in the EFED review (i.e. excluding sediment data requirements) and as was discussed under Magnitude of the Residue - Water, the treatment area for the Lake Seminole study was at the confluence of several small streams, making exact determination of water flow rate and direction difficult.

In conclusion, additional geographically representative data on the magnitude of the residue in fish/shellfish are required to support the proposed permanent tolerances on fish/shellfish. As per the Guidelines although field studies under natural conditions using cages are preferred, controlled exposure aquaria studies are also acceptable. Fish residue data for both predators (e.g., bass) and bottom feeders (e.g., catfish) are required. CBTS notes that the proposed aquatic use encompasses wetland areas and that the available data indicate that higher residues are likely in shellfish than fish. Accordingly, based on the current proposed use it is imperative that adequate residue data on molluscs (e.g., clams, oysters) and crustaceans (e.g., shrimp, crabs) are provided.

Irrigated Crops

Data on triclopyr residues in irrigated crops submitted under PP#1F03991 for the proposed use of triclopyr on rice is discussed below.

DowElanco Rice Herbicide was applied to water used to irrigate 29 crops including bulb, forage, leaf, root and seed crops, fruits, grains, legumes, nuts and vegetables at sites in nine States including Florida, Michigan, Mississippi, Missouri, New York, Oregon, Texas and Washington. Irrigation was performed with sprinkler systems or flooding with water containing 10 and 100 ppb triclopyr, at a rate of two or four acre-inch. Crops were harvested five to 80 days after treatment and analyzed for triclopyr. In a second study located at Davis, California, DowElanco Rice Herbicide was applied at application rates of 0.008 lb a.i./A (calculated to be 100 ppb) and 0.08 lb a.i./A (calculated to be 100 ppb) with sprinkler irrigation systems from three to forty-six days before treatment. Data on the volume of treated water used to calculate the above different application rates (i.e. 100 ppb = 0.008 or 0.08 lb a.i./A) was not provided and accordingly the reason for the discrepancy in the application rates is unknown. The petitioner may wish to submit an explanation.

Fruit and vegetable samples were analyzed for residues of triclopyr using modifications of methods ACR 77.5 ACR 84.4 with a lower validated quantitation level of 0.05 ppm. Some of the water samples were analyzed for triclopyr using modifications of method ACR 76.8 with a lower validated quantitation level for these two methods of 0.01 ppm. Fortification and recovery data was not provided. A storage stability study is in progress and as not yet been submitted but preliminary data indicate no loss of triclopyr in water for 556 days, in apples for 612 days and in alfalfa and vetch green forage for over 5 years.

Irrigation water samples taken from a 10 ppb application rate contained from ND to 17 ppb triclopyr, and the water from the 100 ppb application rate contained 70 to 140 ppb. no residue data from the 10 ppb application rate was presented. The following is a summary of the triclopyr irrigated crop residue data using water at the 10 ppb application rate from the study:

Table 1
SUMMARY OF TRICLOPYR IN 100 PPB TREATED CROPS

		TRICLOPYR FOUND (ppm)		
		CONTROLS	TREATED	
	CROPS	GROSS	GROSS	CORRECTED
1.	Alfalfa Green Forage	0.00-0.005	0.00-0.01	ND-<0.05
2.	Alfalfa Cured Hay	0.00	0.00	ND
3.	Almonds	0.00	0.00	ND
4.	Almond Hulls	0.00	0.00	ND
5.	Apples	0.00-0.002	0.00-0.001	ND
6.	Avocados	0.00	0.00	ND
7.	Beans	0.00	0.00	ND
8.	Bean Vines	0.00	0.00	ND
9.	Bell Peppers	0.00	0.00	ND
10.	Blackberries	0.00	0.00-0.001	ND
11.	Broccoli	0.00	0.00-0.004	ND
12.	Cabbage	0.00-0.007	0.002-0.007	ND
13.	Cantaloupe	0.00	0.00	ND
14.	Carrots	0.00-0.003	0.017-0.024	ND-<0.05
15.	Cherries	0.00	0.00	ND
16.	Corn Grain	0.00-0.001	0.001-0.12	ND
17.	Corn Fodder	0.001-0.006	0.00-0.002	ND
18.	Cottonseed	0.00-0.003	0.00-0.027	ND-<0.05
19.	Cucumber	0.00	0.00-0.001	ND
20.	Eggplant	0.00	0.00	ND
21.	Filbert Nuts	0.00	0.00-0.003	ND
22.	Garlic	0.00	0.00-0.004	ND
23.	Grapefruit	0.00	0.00	ND
24.	Grapes	0.00	0.00	ND
25.	Hops	0.00-0.10	0.00-0.007	ND
26.	Lettuce	0.024-0.053	0.038-0.054	ND
27.	Limes	0.00	0.00	ND
28.	Onions	0.00	0.00-0.006	ND
29.	Oranges	0.00	0.00	ND
30.	Peaches	0.00-0.003	0.00-0.002	ND
31.	Pears	0.00	0.00	ND
32.	Peas	0.00-0.001	0.004-0.026	ND-<0.05
33.	Pea Vines	0.002-0.003	0.006-0.008	ND
34.	Peas in Pod	0.00	0.00	ND
35.	Pea Hay	0.00	0.00	ND
36.	Plums	0.00	0.00	ND
37.	Potatoes	0.00	0.00	ND
38.	Soybeans	0.001-0.002	0.006-0.007	ND
39.	Soybean Straw	0.00-0.002	0.116-0.214	0.19-0.26
40.	Spinach	0.00	0.00	ND
41.	Squash	0.00	0.003-0.006	ND
42.	Strawberries	0.00	0.00	ND
43.	Tomatoes	0.00	0.002-0.006	ND
44.	Vetch Green Forage	0.00	0.00	ND
45.	Vetch Cured Hay	0.00-0.006	0.020-0.032	ND-<0.05
46.	Walnuts	0.002-0.004	0.002-0.003	ND
47.	Wheat Grain	0.00-0.002	0.001-0.003	ND
48.	Wheat Straw	0.00-0.010	0.002-0.049	<0.05-0.05

Average triclopyr residues were non detectable (i.e. < 0.025 ppm) in all but the following six crops which were irrigated at a rate of 2 acre-in/acre except wheat straw at a rate of 2.2 acre-in/acre:

carrots (MS):	ND - < 0.05 ppm
cottonseed (MS):	ND - < 0.05 ppm
peas (MS):	ND - < 0.05 ppm
soybean straw (MS):	0.19 - 0.26 ppm
vetch cured hay (MI)	ND - < 0.05 ppm
wheat straw (MI)	< 0.05 - 0.05 ppm

Irrigated crop residue data for all the crop groupings see (see 40 CFR §180.34) plus crops that don't fall into the crop groupings reflecting the proposed use are required. As discussed under the Nature of the Residue - Irrigated Crops, three plant metabolism studies are also required to determine the nature of the residue in irrigated crops. Accordingly, any decision on the adequacy of the irrigated crop field trial data is deferred pending review of the crop plant metabolism studies and a determination of the nature of the residue in plants.

In light of the proposed 0.50 ppm action level proposed for triclopyr in potable water, irrigated crop residue data reflecting irrigation water containing 0.10 ppm (100 ppb) triclopyr are not acceptable. The minimum acceptable concentration of triclopyr in water for an irrigation crop residue study must equal the proposed potable water action level which is currently 0.50 ppm triclopyr, since it is always possible that potable water could be used for irrigation. Also, in future submissions for sprinkler irrigation some data on water volume should be provided if application rates are expressed in a.i./A. Accordingly, a new irrigation crop residue study using treated water at a minimum triclopyr concentration of 0.50 ppm is required.

Rotational Crops

A decision on the need for separate tolerances on rotational crops is deferred pending EFED's review and conclusions of rotational crop data submitted under 165-1: Confined Rotational Crops. In the interim and in the absence of an established need for rotational crop tolerances or rotational crop field trial data the proposed Section F for crop tolerances resulting from the use of treated water for irrigation crops should be revised to exclude reference to tolerances for rotational crops.

Processed Foods

A fish/shellfish processing study is required which provides residue data in whole fish protein concentrate and processed fish products (e.g. smoked, canned, etc.). The processing study should simulate commercial practices as closely as possible. Fish samples used in the processing study must contain detectable residues, preferably at or near the proposed tolerance levels, so that concentration factors for the various processed products can be determined. If necessary fish should be exposed to an exaggerated ambient residue level, in order to obtain sufficient residue level for the processing studies. Adequate storage stability data for the processed fish products should also be provided to validate analytical results.

Permanent tolerances on irrigated crops/crop groups will be required. Accordingly, processing studies simulating commercial food processing will also be required if finite residues occur in irrigated crops.

The current submission includes a rice processing study (MRID# 418659-01) completed 6/15/89. In summary rice was treated with Garlon 3A herbicide at two locations using aerial application at Rohwer, Arkansas and by backpack sprayer at Beaumont, Texas Ground application was at a rate of either 1.3 pints/A (0.50 lbs a.e./A) applied 7-14 days following panicle initiation, but prior to booting or 1.0 pint/A (0.38 lbs a.e./A) applied at the 3 to 4 leaf stage plus 1.0 pint/A 7-14 days following panicle initiation, but prior to booting. Aerial application was at a rate of 1.3 pint/A (0.50 lb a.e./A) applied following panicle initiation, but prior to booting.

Samples of rice grain and straw were collected at normal harvest 44-59 days following application. Samples were harvested by combine, frozen and shipped to the Residue Research Laboratory, Dow Chemical U.S.A., Midland, Michigan. Rice grain from the two locations having the highest residues were shipped to Stoneville Associates for processing into fractions and process fraction samples were returned to the Residue Research Laboratory, Dow Chemical U.S.A., Midland , Michigan where they were again maintained frozen until they were shipped to A & L Great Lakes Agricultural Laboratories for determination of triclopyr and TCP or analyzed in house for 2-methoxy-3,5,6-trichloropyridine.

Residues of triclopyr, TCP and 2-methoxy-3,5,6-trichloropyridine in the rice grain were determined under the rice field trial data (see 6/16/88 review of M. Metzger). Residues of triclopyr, TCP and 2-methoxy-3,5,6-trichloropyridine in the rice process fractions were determined by modifications of the GC method ACR 84.2 (i.e. similar to Method I published in Pam II for triclopyr) with the recovery range from 42-75, 81-101, and 91-103%, respectively. We note that the method modifications differ from those used for the rice field trial data and resulted in poorer recoveries for the parent.

Rice grain from treatment at the two sites (i.e. Rohwer, Arkansas and Beaumont, Texas) was processed into rice bran, rice hulls, and polished rice. A description of the rice processing procedure was not provided. Corrected residues of triclopyr at the Rohwer, Arkansas site were 0.11-0.14, 0.08, 0.05, and 0.02 ppm in the rice grain, rice bran, rice hulls, and polished rice, respectively, with non detectable (ND) residues of TCP and 2-methoxy-3,5,6-trichloropyridine; and corrected residues of triclopyr at the Beaumont, Texas site were 0.09, 0.02, 0.02 and ND, in the rice grain, rice bran, rice hulls, and polished rice, respectively, with from ND to 0.05 ppm residues of TCP and 2-methoxy-3,5,6-trichloropyridine.

The rice processing study indicates that neither triclopyr or its TCP and 2-methoxy-3,5,6-trichloropyridine metabolites concentrate in rice processed fractions. However, a final decision on the adequacy of the rice processing study is deferred until the nature of the residue in rice is known, a description of the processing procedures used in the processing study are provided and additional information on the conditions of sample storage during the study (e.g. to and from the processor) are provided.

Meat, Milk, Poultry and Eggs

Dairy and beef cattle feeding studies, for triclopyr and its pyridinol metabolite (i.e. a total of four feeding studies two on beef cattle and two on dairy cattle) were reviewed under PP#1F2508 (see 10/30/81 memo of R. Perfetti). In brief finite residues of triclopyr and its pyridinol metabolite were detected in tissues at all feeding levels of 10 to 1000 ppm and were also detected in milk at feeding levels of 30 ppm and up. The following is the review of the dairy cattle feeding study dosed with triclopyr:

> A third study reflecting dosing lactating dairy cattle progressively at 10,30,100, 300 or 1000 ppm in the diet using a graduated procedure allowing two weeks treatment at each dosage level. Pooled evening and morning milk samples were collected twice during the first week and 3 times during the second week of medication at each dosage level. Cream samples were taken from morning milk only, but on the same schedule as for milk. Residues of triclopyr in milk at the 3 lowest dosage levels were <0.01 ppm. Residues of parent at the 300 and 1000 ppm treatment levels were <0.01 to 0.04 ppm. The real triclopyr residue values decreased to non-detectable after 4 days of withdrawal. Residues of 3,5,6-trichloro-2-pyridinol in milk were detectable at the 100, 300 and 1000 ppm treatment levels. These residues ranged from <0.01 to 0.23 ppm. The alcohol residues in milk decreased to <0.01 ppm after 4 days of withdrawal.
>
> Analysis of cream samples and comparison to corresponding whole milk analyses showed that the parent compound tends to concentrate in the cream (cream/milk ratio of 7 to 18) while the alcohol shows no significant preference i.e., cream/milk ratio ~1. No detectable residues of 2-methoxy-3,5,6-trichloropyrdine were observed in any milk samples fed 1000 ppm triclopyr

The Response to Phase 3 Submission (i.e. Phase 4 Review) for triclopyr, triethylamine and the butoxyethyl ester concluded the following for Guideline requirement 171-4(j) Mag. meat/milk/poultry/egg:

> Comments: Much of the data submitted under reformat MIRDs 92189063 and 92189064 was reported as "zero" rather than "< (limit of detection)."Future submissions must report the lowest reasonable reportable value. This guideline will be further evaluated when the field trial information is submitted.

Tolerances for triclopyr and its metabolites on grass forage and hay at 500 ppm and in milk; meat, fat and meat byproducts except liver and kidney; and liver and kidney for cattle, goats, hogs, horses and sheep at 0.01, 0.05 and 0.5 ppm, respectively are established under 40 CFR §180.419. The basis for the tolerances on animal commodities was discussed under PP#1F2508 (see April 1, 1985 memo of M. Bradley) as follows:

> By extrapolation from the tissue withdrawal data for 3, 7, and 21 days after cattle were fed 1000 ppm for 28 days, residues in meat, fat and meat byproducts (except liver and kidney) are not likely to be detectable and the proposed tolerance at method sensitivity level of 0.05 ppm is appropriate. The predicted residue of parent and metabolite in kidney and liver is 0.6 and 0.7 ppm, respectively, after three days withdrawal from the 1000 ppm feeding level. Therefore, we conclude that the proposed 0.5 ppm tolerance for liver and kidney is adequate for the new use on grass on which there will be a maximum triclopyr residue.
>
> The label bears a restriction against grazing lactating dairy animals and cutting for hay during the year of treatment. Because residues are still present in grass at 1 year after treatment, we conclude that milk, as well as meat, fat and meat by-products, falls into category (2) of 40 CFR §180.6(a) and a method sensitivity tolerance of 0.01 ppm should be proposed for residues of triclopyr and its metabolite, 3,5,6-trichloro-2-pyridinol in milk. Additionally, the label should be revised to preclude grazing of lactating dairy animals and cutting for hay for 1 year after treatment.

A poultry feeding study (i.e. MRID# 41200304) has been submitted under PP#1F03991. In summary the feeding portion of the study was conducted from 1/5/87 to 3/3/87 at ABC laboratories in Columbia, Missouri with the analytical work in 7-9/87 by Xenos Laboratories. Nine groups of 12 hens each were used for the study representing the following; two control groups, 0.10 ppm dosage, 0.50 ppm dosage, two 2.5 ppm dosage groups, 2.5 ppm dosage with a 7 day withdrawl period, 2.5 ppm dosage with a 14 day withdrawl period, 2.5 ppm with a 28 day withdrawl period. The hens were housed off-floor in individual metabolism cages with a two week conditioning period.

Triclopyr acid with a purity of 98.8% was dissolved in acetone and brought to a known volume and the appropriate amount was added to a cellulose capsule using a microliter syringe. Dosage levels of 0, 1, 5, and 25x (0.1, 0.5, and 2.5 ppm) the maximum expected intake from residues in chicken feed resulting the proposed uses of triclopyr on crops was administered each morning via capsule based on daily dry matter intake. All hens were slaughtered between 16 and 20 hours after the last feeding with the groups representing the withdrawl period maintained on basal rations for the withdrawl period.

Eggs were collected twice daily from one control group , the 0.10 and 0.50 ppm dosage group and the 2.5 ppm dosage group with the 28 day withdrawl period. Composite muscle from one breast, one thigh and one leg; all available peritoneal fat; and the entire liver minus gall bladder were collected from each hen. Individual muscle samples were collected in polyethylene bags,and fat and liver samples were collected in ointment containers. All samples were frozen as soon as possible and shipped to the North American Agricultural Products Department residue group in Midland, Michigan. Muscle samples were put through a meat grinder and refrozen. All samples were stored frozen until analyzed.

The analytical methodology used for poultry was similar to Pam Method II (i.e also Dow Chemical Method ACR 77.2), (see Analytical Methods-Plants/Irrigated Crops/Animals). Average recoveries for fortifications of triclopyr from 0.05 to 1.0 ppm were 84, 79 and 82% for muscle, liver and fat; respectively, and 94% for eggs fortified at levels from 0.05 to 0.40 ppm. Average recoveries for fortifications of 3,5,6-trichloro-2-pyridinol (TCP) from 0.05 to 0.30 ppm were 88, 88, 74 and 85% for muscle, liver, fat and eggs respectively.

The lower quantitation level was 0.05 ppm. Non detectable (ND) was defined as less than 1/2 the lower quantitation level and all gross residues were corrected for average recovery. All muscle and egg samples for all dosage groups contained ND residues of triclopyr and TCP. Liver and fat samples from the 2.5 ppm dosage group with no withdrawl period contained triclopyr residues from ND to 0.07 ppm and from ND to 0.08 ppm, respectively. The 2.5 ppm dosage groups with the withdrawl periods contained ND residues of triclopyr or TCP in liver and from ND to < 0.05 ppm in fat. Liver samples from the 0.10 and 0.50 ppm dosage groups and muscle samples from the 0.50 ppm dosage groups were not analyzed.

We can make the following assumptions concerning the water consumption of livestock and poultry:

A 0.5 ppm tolerance for potable water would contribute approximately 4.5 ppm/day to the diet of cattle assuming a dairy cow can consume up to 135 kg water/day and has a dry diet of 15 kg/day (135 kg/day ÷ 15 kg/day x 0.5 mg/kg). Similarly, poultry can consume up to 0.23 kg water/day and assuming a dry diet of 0.14 kg/day, 0.5 ppm in the potable water would add approximately 0.82 ppm to the diet of poultry each day.

The maximum dietary intake for turkeys/broilers likely from the proposed tolerances on rice and irrigated crops, (i.e. 0.30 ppm x 40% = 0.12 ppm and 0.05 ppm x 60% = 0.03 ppm or a total of 0.15 ppm) and from potable water of 0.82 ppm = 0.97 or approximately 1.0 ppm. Accordingly, the highest application rate used in the poultry feeding study (i.e. 2.5 ppm) represents a 2.5 X feeding level and the maximum resulting residue in edible poultry tissue was ~~0.08 ppm~~ in the liver. Although, the Guidelines indicate a preference for feeding studies conducted at 3X and 10X dosage levels, an additional feeding study at this time would not contribute any additional information since tolerances on poultry commodities will be established at the limit of quantitation or 0.05 ppm .

Feed items included in this petition are livestock and poultry drinking water, rice and rice straw and irrigated crop residues (covering all the crop groups including vegetables, fruits, grains, forages, etc.).

CBTS is deleting the previous requirement (see PP#1F03935; 11/27/91 review of G. Otakie Conclusion No. 14.a.) for a new ruminat feeding study and a revised Section F proposing tolerances on meat, fat, meat by-products, milk, and milk fat based on the fact the majority of ruminant dietary burden results from the approved triclopyr tolerances on grass forage and hay (i.e. 500 ppm) rather than the proposed uses under these petition's. The need for a new ruminant feeding study and revised tolerances will be evaluated as part of the List B Reregistration Process.

However, a revised Section F proposing tolerances of 0.05 ppm on poultry eggs, meat, fat and meat byproducts except kidney is required for the proposed uses.

Other Considerations

1. An International Residue Status Sheet is attached to this review as Attachment 1. Since Codex, Canada, or Mexico have no established tolerance/limit covering residues of triclopyr or its metabolite in/on potable water, fish or shellfish, rice or irrigated crops there are no compatibility problems at this time.

2. Multiresidue testing data for triclopyr and its regulated metabolites are required.

Attachment 1: International Residue Limit Status
cc with Attachment: G. Otakie (CBTS), E. Haeberer (CBTS), RF, SF, PP#1F03935, PP#1F03991, Triclopyr List B File
RDI:E. Haeberer, 8/20/92: R. Lorranger, 9/3/92

F. [illegible] 8/17/92

INTERNATIONAL RESIDUE LIMIT STATUS

CHEMICAL TRICLOPYR

CODEX NO. ____

CODEX STATUS:

/✓/ No Codex Proposal Step 6 or above

Residue(if Step 8): ____

Crop(s)	Limit (mg/kg)

PROPOSED U.S. TOLERANCES:

Petition No. 1F03935 + 1F03991

RCB Reviewer OTAKIE

Residue: TRICLOPYR AND METABOLITE (2-METHOXY-3,5,6-TRICHLOROPYRIDINE) IN WATER AND CROPS AND JUST PARENT IN POULTRY COMMODITIES

Crop(s)	Limit (mg/kg)

SEE ATTACHED SHEET

CANADIAN LIMITS:

/✓/ No Canadian limit

Residue: ____

Crop(s)	Limit (mg/kg)

MEXICAN LIMITS:

/✓/ No Mexican limit

Residue: ____

Crop(s)	Limit (mg/kg)

NOTES:

Form revised 1986

PROPOSED TOLERANCES

0.2 PPM IN FISH
1.0 " " SHELLFISH
0.3 " " RICE GRAIN
8.0 " " RICE STRAW

PROPOSED ACTION LEVEL AT:
0.5 PPM IN POTABLE WATER

0.1 PPM IN POULTRY MEAT, FAT AND MEAT BYPRODUCTS EXCEPT KIDNEY
0.05 PPM IN EGGS

AND IRRIGATED CROPS AND CROP GROUPINGS:

0.05 ppm in/on Avocadoes
0.05 ppm in/on Brassica
0.05 ppm in/on Bulb Vegetables
0.05 ppm in/on Citrus Fruits
0.05 ppm in/on Cotton Seed
0.05 ppm in/on Cucurbit Vegetables
0.05 ppm in/on Fruiting Vegetables
0.05 ppm in/on Grain Crops excluding rice grain
0.10 ppm in/on Grain Crops Forage, Fodder excluding rice straw
0.05 ppm in/on Hops
0.05 ppm in/on Leafy Vegetables
0.05 ppm in/on Leaves of Root and Tuber Vegetables
0.05 ppm in/on Non-Grass Animal Feeds
0.05 ppm in/on Nuts
0.05 ppm in/on Pome Fruit
0.05 ppm in/on Root Crops, Vegetables
0.05 ppm in/on Legume Vegetables
0.50 ppm in/on Legume Vegatables Forage
0.05 ppm in/on Small Fruit
0.05 ppm in/on Stone Fruit